Health Level Seven (HL7) – Electronic Health Record Work Group (EHR WG) – "Reducing Clinician Burden" (RCB) Project

DRAFT Response – 31 Dec 2018
Known Clinician Burdens compared with ONC Draft for Public Comment – "Strategy on Reducing Regulatory and Administrative Burden Relating to the Use of Health IT and EHRs" (published 28 Nov 2018, comments due 28 January 2019)

Clinician Burden Topics and Language derived from HL7 EHR WG RCB Project including Analysis Worksheet and Reference Sources
Link: http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG#.22Reducing_Clinician_Burden.22_Project

Columns below:
Topic – "Reducing Clinician Burden" topic – [##] corresponds to topic identifier in RCB Analysis Worksheet
The clinician burden – describes what clinicians see as their challenge and the compulsory load they must carry
ONC – Is this burden addressed in the ONC DRAFT? If so, designated by Initiative[I], Strategy[S] and Recommendation[R]

	Topic	The clinician burden...	ONC
Generally [1]			
	Mandates, Impositions, Overload	Faced with mandates and no control: • "No other industry... has been under a universal mandate to adopt a new technology before its effects are fully understood, and before the technology has reached a level of usability that is acceptable to its core users." – New England Journal of Medicine, Transitional Chaos or Enduring Harm? The EHR and the Disruption of Medicine, 22 Oct 2015 • "Many clinicians know what they want — but haven't been asked... Our biggest mistake lies not in adopting clunky systems but in dismissing the concerns of the people who must use them." – Ibid. • "Although the original intent behind the design of EHRs was to facilitate patient management and care, the technology largely has been co-opted for other purposes. Payers see the EHR as the source of billing documentation. Health care enterprises see it as a tool for enforcing compliance with organizational directives. The legal system sees the EHR as a statement of legal facts. Public health entities see it as a way to use clinicians to collect their data at drastically reduced costs. Measurement entities see the EHR as a way to automate the collection of measure data, reducing their reliance on chart abstraction. Governmental entities see it as a way to observe and enforce compliance with regulations. All these impositions on EHR systems have created distractions from their potential value in supporting care delivery... The ability of these systems to support care delivery will not improve unless physicians and others who deliver care insist that the functions needed by clinicians and their patients take priority over nonclinical requirements." – American College of Physicians, Putting Patients First by Reducing Administrative Tasks in Health Care, 2 May 2017	
	Practice Constraints	Faced with constraints on clinical practice: • Must spend more time dealing with constraints on how to do their jobs and less time simply doing them • Must conform their clinical practice to constraints of EHR/HIT system	
Patient Safety (and Clinical Integrity) [2]			
	Safe Use, Clinician Oversight	Confronted by challenges regarding selection, governance, safe use and proper engagement of EHR/HIT systems/software • Safe design and development of EHR/HIT software • Safe configuration and implementation of EHR/HIT systems: data capture, content, context, sequence; patient flow, work flow, information flow... • Often without rigorous testing • Often without clinician review, supervision and guidance	Partial I2.S4.R1
	Decision Support	Faced with concerns regarding validity of metrics, algorithms, units and methods of measure...	Partial I2.S1.R2 I2.S4.R1
	Integration, Overload	Concerns about system and data integration, information overload, missing or overlooked data resulting in missed or delayed diagnosis, improper dosing, incorrect treatment...	

	Topic	The clinician burden...	ONC
	Usability, user interface	Concerns regarding system usability, poor or counter-intuitive user interfaces layout; confusing selection choices; obverse display order, mis-selected options, including selection of wrong patient...	Partial I2.S1.R1 I2.S2.R1-R3
	Alerts, reminders	Concerns regarding alert fatigue, missed or mis-configured alerts, reminders, notifications...	Partial I2.S1.R2
	User Competence	Faced by lack of experience and training	I2.S4.R1-R2
	Risk Reporting	Confronted with lack of mechanisms for users to report safety risks and assurance that they are addressed in a timely manner	Limited I2.S2.R1
Identity Matching [34.1]			
	Patient Identity, Identity Matching	Uncertain as to proper patient matching and true identity of records received from elsewhere • No national patient ID for healthcare • Mismatched ID attributes: common identifiers, name (first, middle, last, prefix, suffix), birthdate, birth sex, birthplace, mother's maiden name... • One record, two (or more) patients OR two (or more) records, one patient	**No**
Identity and Credential Management [34.2]			
	Identity Management	Uncertain as to if/how identity and identifiers are managed: • Persons: patients, individual and organizational providers • Places: locations, addresses, points of care/service (offices, patient rooms, exam and procedure rooms) • Medical devices, monitors, instruments • Stationary hardware, devices, networks, addresses • Mobile devices • Within and across organizations • Within and across municipalities, states, regions, nations	**No**
	Credential Management	Faced with uncertainty as to if/how professional credentials are managed, verified and renewed	**No**
Data Quality and Integrity [35]			
	Data Authenticity	Uncertainty as to data accuracy/authenticity if sourced elsewhere	**No**
	Data Provenance	Uncertainty as to data provenance if sourced elsewhere: who (author, credential(s), role), what (action taken), when (date/time, sequence), where (location), why (purpose of capture), how (method), under what conditions, units and method of measure	**No**
	Data Context	Uncertainty as to data context: clinical (purpose/rationale, conditions), administrative, operational	**No**
	Data Completeness	Uncertainty as to whether data is complete, partial or missing	**No**
	Data Verification	Uncertainty as to whether data has been verified, whether from manual or automated entry • If verified, by whom (clinician, credentials), when (date/time) and by what method?	**No**
	Data Update	Uncertainty as to whether data has been updated or corrected • Do new value(s) supersede the old? • If updated, by whom (clinician, credentials) and when (date/time)? • Are clinical decisions and care/treatment plans, based on previous data values, at risk?	**No**
	Data Distortion	Uncertainty as to whether data has been distorted, end-to-end from source to use and during system-to-system exchange • Was data transformed? From one code/value set to another? From one human language to another? • Was the original source content and context carried forward without alteration? • Were data structures and semantics preserved? • Was data naming and definition preserved? • Were errors, alterations or omissions introduced in the course of exchange?	Partial I3.S2.R1

	Topic	The clinician burden...	ONC
	Data relationships	Concerns regarding missing or incorrect linkages between medications, allergies, problems, diagnoses, encounters, assessments, clinical decisions, diagnoses, orders, results, diagnostics, interventions, procedures, observations, therapies and care plans	**No**
Process Integrity [36]			
	Actions Taken	Uncertainty as to who did what, when, where and why	**No**
Administrative Tasks [3]			
	Governmental, Regulatory, Accreditation	Faced by time-intensive administrative tasks to support: • Federal government regulatory mandates: ACA, HIPAA, Stark, MACRA, MIPS, Medicare/Medicaid... • State government and regional regulatory mandates • Accreditation guidelines: JCAHO, NCQA, URAC, ISO 9000...	Partial I1.S1.R1-R4 I3.S1.R1-R5 I3.S2.R1-R3 I3.S3.R1-R3
Data Entry [4]			
	Unrelated to Immediate Care or Patient Needs	Faced by requirements to enter myriad data unrelated to the clinician's specialty or immediate reason for care/treatment, bloating the clinic note • Structured documentation tools often make it difficult to communicate the complex details of patients' care and nuanced clinical reasoning • Instead desire to create a concise narrative and be done	Partial I1.S1.R1-R4 I1.S2.R1-R2 I2.S1.R3 I2.S2.R1-R4 I2.S3.R2 I2.S4.R3
	Driven by External Factors	Confronted by hundreds of structured data items to comply with external drivers • External drivers include: billing and claim substantiation, measures for quality, value and performance programs, compliance (e.g., accreditation, consents, patient education), avoiding malpractice claims	
	Duplicative	Faced by need to re-enter data already captured in the patient record	
	Cumbersome	Contending with: • Cumbersome array of poorly designed data entry methods, a multiplicity of input screens, inefficient flows, navigation of deeply nested drop-down menus, long pull-down pick lists that are neither filtered nor contextualized, keyed entries, pointing devices... • Multiple disparate user interfaces across care settings, systems and apps, multiple sign-ons required... • Mismatched granularity of coded entry vs. intended (preferred) description, often code/value set offers choices too specific or too general	
	Patient Story	Confronted with lack of clear patient story and history: • Narrative is often lost due to poor syntax, note construction templates combined with structured data elements	**No**
Data Entry Scribes [5]			
	Proxies	Faced with added cost of data entry scribes • Often accompanied with excessive error rates and high turnover	**No**
Clinical Documentation – Quality and Usability [6]			
	Chart Review	Confronted by time-consuming, tedious, if not often incomprehensible, chart review task • Hard to find current, usable, action-able items among vast volumes of data (mind-numbing combat with note bloat) • Hard to discover if data has been updated with more current values • Hard to discover if data is accurate/authentic, has been verified, or is simply noise • Difficult to navigate blobs of external data that are discontinuous and disjoint from locally generated content • Difficult to distinguish excessive/duplicate notes carried (copied) forward without useful new information • Lack of available tools to efficiently incorporate complicated data into information, track multiple highly complex problems, and maintain/ensure continuity of medical decision making • Difficult to track patients care and treatment over time and space	Partial I1.S2.R1-R2 I2.S1.R3-R4 I2.S3.R1-R3
	List Review and Management	*See "Problem List", "Medication List", "Allergy List", "Immunization List" and "Surgery, Intervention and Procedure List" Sections*	

	Topic	The clinician burden...	ONC
	Data Integrity	*See "Data Integrity" Section*	*See Section(s) Indicated*
	Process Integrity	*See "Process Integrity" Section*	
Prior Authorization, Coverage Verification, Eligibility Tasks [7]			
	Tedious, Time-Consuming Process	Contending with tedious and time-intensive tasks to verify and document coverage, coverage limits and authorization for particular tests, procedures, medications, supplies and referrals • Difficult to navigate rules and criteria • Often required to provide details, check boxes and fill out variant forms for each payor • Often requiring lengthy phone calls to achieve satisfactory resolution • Often requiring dedicated staff to follow each request to conclusion • Sometimes leading to delayed or interrupted treatment and even severe to life-threatening health outcomes • Sometimes requiring patients remain hospitalized while awaiting authorization for necessary services or supplies that otherwise would allow them to be discharged earlier, increasing costs and putting them at risk for added complications	Partial I1.S3.R1-R5
Provider/Patient Face-to-Face Interaction [8]			
	Engagement and Dialogue	Confronted with constant interference in, and impediment to, the clinician/patient relationship • Finding patients are put off by screen gaze instead of direct eye contact • Noticing interruptions in the flow of conversation, often with long periods of silence, amid perception of being distracted, disengaged, and less then patient-focused during the consultation • Finding that patients feel uncomfortable, reluctant to express concerns, ask questions, or talk while clinician is typing or looking at the screen, • Finding that less time spent interacting with the patient tends to lower the quality of care, patient satisfaction, and reimbursement because appointments are longer with fewer scheduled in a day	Limited I2.S2.R4
	Flow Management	Confronted with: • Counterproductive work, information and data entry flows that distract from patient engagement at the point of service/care	Partial I2.S2.R1-R4 I2.S2.R1-R4
Provider/Patient Communication [9]			
	Sharing and Interaction	Faced with challenges of communication: • Finding that patients have a limited view of their digital health information and often have difficulty communicating with their care team • Finding that patient portals are not easily navigated and shared, except to accomplish the most basic aspects of medication refills or to request an appointment	**No**
Care Coordination, Team-Based Care [10]			
	Interaction, Communication	Contending with limited/no team-oriented functionality: • Lack of efficient tools for immediate/continuous interaction with team members, particularly across organizations/systems • Face-to-face team interaction is most efficient but phone-based text/messaging often works better than EHR-facilitated communication	Limited I1.S2.R1 I2.S1.R1-R2 I2.S2.R4
	Assignment, Delegation	Faced with limited ability to: • Delegate, assign or distribute data entry or other tasks to team members • Share role or task responsibility or accountability	**No**
	Standards of Practice	Constrained by limitations, across services and specialties and across organizations: • Lack of uniform educational requirements, standards of care, and standards of conduct for clinical teams	**No**
	Enforced Clinical Roles	Dealing with limited functionality to: • Accommodate substantial differences in the HIT needs of different clinical roles (nurse vs physician), clinical situations (acute vs chronic care), clinical environments (intensive care unit vs ambulatory clinic) and institutions, stifling multi-user communication, coordination and collaboration	**No**

	Topic	The clinician burden...	ONC
		• Capture the same essential data among multiple members of the care team, including key fields essential for care management, care gap analysis for prevention, and clinical care maintenance – often simply not available	
	Isolation	Faced with limited ability to: • Know that patients have been (are being) seen by other clinicians • Gain awareness – often too late for meaningful engagement in the care process • Perform discrete tasks outside of isolated "sessions" which are not conducive to shared team engagement • Capture collaborative clinical notes with multiple clinician authors contributing	**No**
	Reimbursement	Faced with reimbursement constraints: • Current payment system is not designed to offset the costs associated with forming, training, and sustaining clinical teams and do not empower all members of the clinical team to meaningfully participate	**No**
Clinical Work Flow [11]			
	Optimization	Faced with limited (or no) functionality to: • Optimize screen/data entry sequences to match work flow, sequence of care delivery and the way clinicians think • Tailor work flows to care setting, service, specialty or individual clinician practice patterns • Ensure pertinent patient information is gathered and available prior to each encounter • Improve balance between reading, writing, thinking, decision making and navigating • Support evolving nature of diagnostic and disease processes	Partial I2.S1.R1-R4 I2.S2.R1-R4 I2.S3.R1-R3 I2.S4.R3-R4
	Cognition	Dealing with: • Information clutter, non-essential screen splays, overtures and missives • Increased cognitive load, decreased situational awareness, often impairing a clinician's ability to comprehend and focus on patient's problem(s) • Recognition, impressions and complex thought patterns that are non-linear and do not fit a generic mold • Variety of disparate and disjoint systems/apps to review patient data from multiple sources	
	Shortcuts	Contending with: • Limitations on training or real-time hints which fail to describe how to unlock key usability functions and shortcuts	I2.S4.R1-R2
	List Review and Management	*See "Problem List", "Medication List", "Allergy List", "Immunization List" and "Surgery, Intervention and Procedure List" Sections*	*See Sections Indicated*
Disease Management, Care and Treatment Plans [12]			
	Guidelines, Rules	Coping with limited functionality to manage: • Guidelines and rules to enable/support care and treatment planning based on diagnosis or known best practices	**No**
Clinical Decision Support, Medical Logic, Artificial Intelligence [13]			
	Rule setting	Faced with limited (or no) functionality to: • Optimize clinical decision support rules based on care setting, service, specialty, clinician practice patterns	Partial I2.S1.R2 I2.S4.R1
Alerts, Reminders, Notifications, Inbox Management [14]			
	Interruptive	Contending with: • Frequent, often non-essential or unrelated, interruptions for clinical and administrative alerts, reminders and pop-up windows that may force hard stops in work flow, thought processes and patient interactions • Alerts and reminders that lack key identifying and contextual information, forcing a digression to a separate system or app • Lack of ability to instantly discern between important information needing immediate response/action versus that which is routine or entirely irrelevant • Alert fatigue	**No**
	Configuration	Constrained by:	**No**

	Topic	The clinician burden...	ONC
		• Inability to designate/configure priorities for alerts, reminders and notifications: e.g., urgent (interrupt) vs. routine (review now or later) • Limitations in ability to automatically route specific message types to other members of the care team	
Information Overload [15]			
	Avalanche	Contending with: • Avalanche of data from external sources, mostly patient summaries • Patient summaries that are an arbitrary snapshot in time and even when taken together never represent a complete patient record or picture of the patient • Data that is stale or irrelevant • Hours spent searching for data that is expected, buried in the muddle or never found	**No**
	Targeted	Faced with limited functionality to ensure: • Smart data synthesis, highlighting data that is timely, concise, pertinent/relevant and action-able • Data targeted to patient problem/diagnosis or condition • Data targeted to receiving clinicians service, specialty, clinical practice patterns and/or preference(s)	**No**
	Data Integrity	*See "Data Integrity" Section*	*See Sections Indicated*
	Process Integrity	*See "Process Integrity" Section*	
Transitions of Care [16]			
	Disjunctions	Confronted with: • Disconnects in transitions from care setting to care setting, including missing information regarding problems, orders, medications and discharge instructions, follow up appointments • Lack of key information when referrals are ordered, including reason for referral • Lack of ready information exchange between referring and referred to clinician, including acceptance of referral and expected plan/schedule for follow up	**No**
Health Information Exchange – Claimed "interoperability" [17]			
	Record Fragments	Faced with time-consuming, tedious, if not often incomprehensible, review of incoming data from external sources • Noting that patient summaries are only record fragments, snapshots in time, subsets, never complete records • Information is seldom synthesized and offered as timely, concise, pertinent/relevant and action-able	**No**
	Lapses	Contending with: • Data known to have been captured elsewhere but is not yet available in local system/app • Situations where passing the baton often results in dropping the baton as it is realized that information was exchanged but not recognized as clinically significant until sometime after the fact, confounding efforts to recover lost time, inaction or inappropriate action	**No**
	Push and Pull	Coping with: • Data that should be pushed but isn't (e.g., incorrect push rules or other misconnect) • Data that is pulled but where the query may: 1) never return a response; 2) be mis-directed; 3) return an incomplete response; 4) return an avalanche response; 5) return a belated response (some hours, days or weeks later)	**No**
	Gaps, Disparities and the Unknown	Contending with affirmative (or negative) trust issues when inbound data is or has been: • Replete with gaps, disparate structures, content and/or representations that are not resolvable • Transformed in the course of exchange – introducing errors. alterations, omissions, mis-mapping, missing context... • Superseded/updated with more current values • Accurate/authentic – with evidence that it is unaltered from its source – or not • Reviewed, verified or attested by a clinician (in the source system/app) before exchange – or not	**No**
	Provenance	Faced with:	**No**

	Topic	The clinician burden...	ONC
		• Data received without evidence of its source or provenance	
	Sharing with the World	Contending with myriad requirements (and potential disjunctions) for sharing such as: • Needing to exchange data with thousands of variant health care systems/apps that patients want to use • Vast structural gaps in achieving true data liquidity and interoperability	
	Identity Matching	*See "Identity Matching" Section*	*See Sections Indicated*
	Data Integrity	*See "Data Integrity" Section*	
	Process Integrity	*See "Process Integrity" Section*	
Medical/Personal Device Integration [18]			
	Separate Worlds	Coping with: • Limited integration of device data in EHR • Detailed data, including trend patterns, that are often more complete and offered at higher resolution on device displays	**No**
Orders for Equipment and Supplies [19]			
	How We Get What Patients Need	Confronted with: • Limited functionality to support orders for equipment and supplies, particularly in the case of discharge order and/or where pre-authorization is required	Limited I1.S3.R1-R5 I2.S3.R2
Support for Payment, Claims and Reimbursement [20]			
	How We Get Paid	Faced by continuing constraints on clinical practice due to reimbursement justification and related documentation requirements – designed for billing and not taking care of patients – and finding that: • Some documentation requirements are a relic of fee-for-service and make little sense in new payment models • All payers, whether public or private, have their own approaches, rules, and requirements related to insurance eligibility verification; appropriate billing for services; prior authorizations for medications, procedures, and other services; appeals for lack of payment; reporting of quality and resource use measures, as well as feedback reports on those measures; referrals and treatment plans; alternative payment model (APM) participation and more • Tasks may differ from payer to payer; appear one month without notice, then reappear modified or changed the next • Very difficult for anyone to review a patient chart, weed through the billing related documentation, and find out quickly and efficiently what they actually need to know about a patient for care and treatment purposes	Not for commercial payers
	Evaluation and Management Codes	Confronted by coding/documentation requirements of US Evaluation and Management (E/M) guidelines for claims/payment • Consumes a significant amount of time and does not reflect optimal clinician workflow, impacting system usability • Constrains notes that target billing requirements, often using check boxes and radio buttons to facilitate calculation of coding points • Creates voluminous patient records and many extraneous notes of little or no clinical value, overrules clarity and concision, and does not result in documentation that readily conveys the essence of an encounter • Requires extra clinician and staff time – unreimbursed • Uses an outdated 1995/1997 framework built on a model of clinical care involving complaint or symptom-based face-to-face encounters between a patient and a clinician... since the 1990s, the nature of clinical work has evolved, including greater emphasis on patient-centered, collaborative models of care with clinical teams working together to manage chronic conditions... the intensity of this work, which often requires complex medical decision-making and care coordination, which is not well represented in the current E/M framework. • Documents parameters that are of marginal relevance to the encounter, but are required in order to receive the level of payment that their effort deserves	Partial I1.S3.R1-R5 I3.S1.R1-R5 I3.S2.R3 I3.S3.R1-R3
	Medicaid	Faced with complex Medicaid (and contractor) billing requirements that vary state by state...	
	MIPS/APMs	Faced with Merit-based Incentive Payment System (MIPS) and Alternative Payment Models (APMs) and their requirements for quality, interoperability, performance improvement, cost management...	
Support for Cost Review, Comparison of Alternatives [21]			
	Economies	Dealing with limited functionality to:	**No**

	Topic	The clinician burden...	ONC
		• Review costs and find comparable alternatives for care, treatment, equipment and supplies	
Support for Measures – Administration, Operations, Quality, Performance, Productivity, Cost, Utilization [22]			
	Scope, Alignment, Value	Contending with capture and reporting of measures which are: • Imposed by public and private payers; governments and policymakers; private certification, accreditation, and recognition organizations; vendors and suppliers; health care consumers; and other clinician practices and health care provider organizations • Not aligned: terms, definition, scope, method of capture/collection and reporting format for each measure • Not captured and stored as discrete and structured elements in health record • Of little value or consequence to immediate patient care and treatment or needs of clinical practice • Beyond the scope of practice and expertise of various specialties • Reported and tallied, by clinician and by organization, but are often so scant as to be clinically insignificant (thus of no value)	Partial I3.S1.R1-R5 I3.S2.R1-R3 I3.S3.R1-R3
Support for Public and Population Health [23]			
		Faced with myriad public health reporting requirements: • Lack of good tools to capture, maintain and report public health data in proper form, at the proper time, to multiple agencies	Partial I4.S1.R1-R2 I4.S2.R1-R3
Legal Aspects and Risks [24]			
	Record Quality and Reliability	Awareness that: • Legal world is routinely demonstrating EHR-sourced records are inauthentic and vary from fundamental requirements for data quality • Concerns regarding direct costs of impeachment of records in legal and regulatory processes • Increasing recognition by payers that EHR-sourced records don't meet their record specification requirements • Internal to clinical organizations, extensive rework costs are absorbed by the provider organization (including clinician time) to "correct" defective documentation	**No**
	Risks, Liability	Contending with: • External data that is typically not integrated with internal data and is not semantically interoperable, such that most internal communications and decisions are informed by an incomplete subset of the data actually available in the organization's system • Serious concerns regarding risks to the safety/quality of care/treatment decisions as well as potential liability on the part of clinicians/organizations for data that is received but not fully reviewed and assessed as to timeliness, relevance and action-ability	**No**
User Training, User Proficiency [25]			
	Development of Skills, Literacy	Faced by: • Insufficiency of training for system/app use • Development of skills and system literacy with a confirmed level of proficiency • Lack of reimbursement for time in training	I2.S4.R1-R2
Common Function, Information and Process Models [26]			
	Endemic Variance	Faced with myriad disparities: • Disjoint system and app functionality • Variant user interfaces based on divergent design choices and usability heuristics • Lack of common data naming, definition, structure, data types, code/value sets, classification schemes, terminology and vocabularies	**No**
Software Development and Improvement Priorities, End-User Feedback [27]			
	Clinician Input	Contending with:	Partial

	Topic	The clinician burden...	ONC
		• Software development priorities primarily based on external and other non-clinical factors (e.g., Meaningful Use, MIPS) not clinical care and treatment, or even patient safety, needs • Limited ability to incorporate clinician (or other end user) input into product design • Software feedback mechanisms which are constrained, hidden or non-existent and even if engaged seldom result in any direct response, much less corrective/remedial action • Vendors and IT staff who often lack clinical knowledge, understanding or expertise and where communication is a dead-end endeavor	I2.S4.R1
	Software Updates	Confronted by software updates: • System/app "fixes" that are ugly appendages to already poorly designed user interfaces • System updates which often incur extended down-time, where work-arounds and manual systems must be deployed • System updates which may not be fully tested before deployment	**No**
	User Centered Design?	Faced with usability issues: • Systems that have been certified for User Center Design yet still exhibit poor usability behaviors	Partial I2.S1.R1-R4 I2.S2.R1-R4
Product Transparency [28]			
	Development	Faced with no/limited disclosure regarding software development lifecycle • How software products (EHR/HIT systems) are designed, developed, packaged, tested, implemented and supported, from inception on • How product requirements are established, vetted and revised over time	**No**
	Implementation	Faced with no/limited disclosure regarding software functionality when implemented • How data is managed and how data flows from source through retention to use • How data is managed during exchange including transformation • How clinical decision support is engaged, how rules are managed, how alerts and other actions are triggered • How clinical workflows are managed, how rules and alternate flows are engaged	Partial I2.S1.R1-R4 I2.S2.R1-R3 I2.S3.R1-R3
Product Modularity [29]			
	Unique Needs	Confronted by unique needs and otherwise limited functionality • Lack of common trust and record infrastructure (including current EHR products) to support system/app modules (or "plug-ins"), selected based on functionality (e.g., supporting specific clinical practice(s), population needs, analytics), usability, user interface, cost and other beneficial and proven characteristics	**No**
Lock-In, Data Liquidity and Switching Costs [30]			
	Transfer of Essential Records	Faced with a heavy penalty if considering another system • Lack of protection against EHR data 'lock in' which contributes to increased dissatisfaction and expense • Significant costs which may be imposed to obtain a usable copy of their data that can be imported into a new EHR system • Costs involved in moving large quantities of data from one system to another	**No**
Financial Burden [31]			
	Market and Vendor Constraints	Contending with market and vendor constraints • The economic model of competition (versus collaboration) and maximizing profit (versus healthcare for the common good) has led to resistance and the preservation of market share for current IT vendors • Concerns over EHR sustainability and high cost of available solutions are a substantial deterrent and limitation to their use • Ever-increasing costs of health IT products and services, including new module(s) needed to perform a specific function • Additional fees for every interface to another system or service, as well as ongoing fees for moving data • EHR vendors who develop and sell systems/apps have a competitive incentive to keep their software proprietary	**No**
Security [32]			
	Data Protection	Faced with requirements for system security and data protection	**No**

	Topic	The clinician burden...	ONC
		• Risks and liability for data breaches • Costs to acquire and maintain security measures and expertise	
Professional Credentialing [33]			
	Knowledge and Application	Must contend with ongoing requirements to maintain professional credentials • Ever-changing body of medical knowledge and application in practice • Lack of good tools to support learning and renewal	**No**
Problem List [37.1]			
	Problem List Management	Uncertainty as to problem list management • Hard to distinguish between formally diagnosed problems, signs, symptoms and other problems • Hard to determine active vs inactive problems • Hard to determine problem timeframe: onset, treatment, resolution • Hard to determine who last reconciled problem list (clinician, credentials), when (date/time) and where • Hard to determine which problems may be missing	**No**
Medication List [37.2]			
	Medication List Management	Uncertainty as to medication list management • Hard to distinguish between prescribed meds and over-the-counter meds • Hard to determine which meds are currently taken • Hard to determine who last reconciled medication list (clinician, credentials), when (date/time) and where • Hard to determine which medications are missing	**No**
Allergy List [37.3]			
	Allergy List Management, including Medication Allergies	Uncertainty as to allergy list management • Hard to distinguish between allergies and sensitivities • Hard to determine which allergies are currently active • Hard to determine which allergies have been treated, the method and disposition of treatment • Hard to determine who last reconciled allergy list (clinician, credentials), when (date/time) and where • Hard to determine f which allergies are missing	**No**
Immunization List [37.4]			
	Immunization List Management	Uncertainty as to immunization list management • Hard to determine which immunizations have been given, by whom (clinician, credentials), when (date/time) and where • Hard to determine which immunizations are due and when	**No**
Surgery, Intervention and Procedure List [37.5]			
	Surgery, Intervention and Procedure List Management	Uncertainty as to surgery, intervention and procedure list management • Hard to determine who performed surgery, intervention or procedure (clinician, credentials), when (date/time) and where • Hard to determine who last reconciled surgery, intervention and procedure list (clinician, credentials), when (date/time) and where • Hard to determine which surgeries, interventions and procedures are missing	**No**